05-25-04

DAC
IFW 1754

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**
**Washington, D.C., United States of America**

In re Application of HU, X. D.

Serial No.: 09/851,177

Filed: May 8, 2001

For: HIGH SURFACE AREA, SMALL CRYSTALLITE SIZE CATALYST FOR FISCHER-TROPSCH SYNTHESIS

**REQUEST FOR WITHDRAWAL OF HOLDING OF ABANDONMENT BASED ON REPLY TIMELY FILED AND RECEIVED IN THE OFFICE BUT NOT CORRELATED WITH THE APPLICATION PURSUANT TO 37 CFR 1.181**

Commissioner for Patents
Group Director 1754
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

We kindly request the United States Patent Office to reinstate patent application 09/851,177 in accordance with 37 CFR § 1.181 based on the following facts:

1. We responded to the March 26, 2003 (3/26/03) office action by fax on September 24, 2003 (Exhibit A).
2. Included was a Petition for Extension of Time Under 37 CFR 1.136(a) for three months with payment by credit card of $930.00 (Exhibit B).
3. We received the Auto-Reply Facsimile Transmission Report on September 24, 2003 with time as 8:36:34 AM (EDT) (Exhibit C).
4. We received a Notice of Abandonment on November 18, 2003 (Exhibit D).
5. On November 26, 2003 in accordance with 37 CFR 1.8 (b), we informed the

USPTO we previously transmitted by fax a response to the office action with mailing date of 03/26/03 (Exhibit E).

6. Since that time we have contacted the Inventor's Assistance Center on numerous occasions that informed us in December and January the application was still abandoned. February, March and April it was stated by the Assistance Center that the application was with the Group Art Unit 1754. We left numerous messages with Stan Silverman who is the head of Group 1700. In May, we were told by the Center they could not tell from the information on the computer exactly where this application was located.

Having satisfied all requirements, applicants respectfully request that this Petition be granted and the holding of abandonment of the application be withdrawn.

Further the applicant respectfully request that the USPTO treat the Response to the March 26, 2003 Office Action as timely filed.

Respectfully submitted,

Joan Simunic, Reg. No. 43,125
Süd-Chemie Inc.
(502) 634-7373
jsimunic@sud-chemieinc.com

Date: 5/20/04

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**FROM:** (PLEASE PRINT) PHONE ( 502 ) 634-7200

Sud-Chemie Inc.
Attention: Legal/IP Department
1600 West Hill Street
Louisville, KY 40210

**TO:** (PLEASE PRINT) PHONE ( 703 ) ~~308-5068~~

Director of Technology Center
Group Art Unit 1754
Mail Stop Non-Fee
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DEC 12 '03

The USPTO date stamp acknowledges receipt of the paper(s) listed

Applicant: Sud-Chemie Inc.
Patent/Application No.: 09/851,177
Filing Date: May 8, 2001
Title: HIGH SURFACE AREA, SMALL CRYSTALLITE SIZE CATALYST FOR FISCHER-TROPSCH SYNTHESIS
Payment: N/A
Attachments: Cover letter; copy of response to office action; copy of auto reply facsimile transmission; copy of notice of abandonment
USPS Express Mail #: ER 521694377 US

Response to notice of abandonment

**Süd-Chemie Inc.**
**1600 West Hill Street**
**Louisville, Kentucky 40210**

**PHONE: (502) 634-7373**
**FAX: (502) 634-7724**

**CONFIDENTIAL AND PRIVILEGED**
**ATTORNEY CLIENT COMMUNICATION**



TO: U.S. Patent and Trademark Office
Examiner: Cam Nguyen Group: 1754
Fax **#703-872-9306**

FROM: Joan L.Simunic Reg. No. 43,125

DATE: September 24, 2003

PAGES: 20 in total (including cover sheet)

RE: U.S. Patent Application No.09/851,177

Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003

Enclosed are:

(1) Transmittal Form.
(2) Fee Transmittal for FY 2003
(3) Credit Card Payment Form
(4) Petition for Extension of Time
(5) Response to Office Action
(6) Clean Unmarked Version of Claims Now in Application

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Donna Ferrill — Person Signing
Donna Ferrill — Signature
9/24/03 — Date

PTO/SB/21 (08-03)
Approved for use through 08/30/2003. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


# TRANSMITTAL FORM

*(to be used for all correspondence after initial filing)*

| | |
|---|---|
| Application Number | 09/851,177 |
| Filing Date | May 8, 2001 |
| First Named Inventor | X. D. Hu |
| Art Unit | 1754 |
| Examiner Name | Cam Nguyen |
| Attorney Docket Number | ZL 494/01001 |

Total Number of Pages in This Submission: 20

## ENCLOSURES *(Check all that apply)*

- [x] Fee Transmittal Form
- [x] Fee Attached
- [x] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [x] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
  - [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
- [ ] After Allowance communication to Technology Center (TC)
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please identify below):

Postcard

Remarks

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

| | |
|---|---|
| Firm or Individual name | Joan L. Simunic, Reg. 43,125 |
| Signature | Joan Simunic |
| Date | September 23, 2003 |

## CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

| | | | |
|---|---|---|---|
| Typed or printed name | Donna Fornill | | |
| Signature | Donna Fornill | Date | September 24, 2003 |

PTO/SB/17 (08-03)
App. for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# FEE TRANSMITTAL for FY 2003

*Effective 01/01/2003. Patent fees are subject to annual revision.*

☐ Applicant claims small entity status. See 37 CFR 1.27

**TOTAL AMOUNT OF PAYMENT** ($) 930.00

| Complete if Known | |
|---|---|
| Application Number | 09/851,177 |
| Filing Date | May 8, 2001 |
| First Named Inventor | X. D. Hu |
| Examiner Name | Cam Nguyen |
| Art Unit | 1754 |
| Attorney Docket No. | ZL 494/01001 |

## METHOD OF PAYMENT *(check all that apply)*

☐ Check ☑ Credit card ☐ Money Order ☐ Other ☐ None

☐ Deposit Account:

Deposit Account Number
Deposit Account Name

**The Director is authorized to:** *(check all that apply)*

☐ Charge fee(s) indicated below ☐ Credit any overpayments

☐ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

## FEE CALCULATION

### 1. BASIC FILING FEE

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description | Fee Paid |
|---|---|---|---|---|---|
| 1001 | 750 | 2001 | 375 | Utility filing fee | |
| 1002 | 330 | 2002 | 165 | Design filing fee | |
| 1003 | 520 | 2003 | 260 | Plant filing fee | |
| 1004 | 750 | 2004 | 375 | Reissue filing fee | |
| 1005 | 160 | 2005 | 80 | Provisional filing fee | |

**SUBTOTAL (1)** ($) n/a

### 2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

| | Extra Claims | | Fee from below | Fee Paid |
|---|---|---|---|---|
| Total Claims | | -20** = | | X = |
| Independent Claims | | - 3** = | | X = |
| Multiple Dependent | | | | = |

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description |
|---|---|---|---|---|
| 1202 | 18 | 2202 | 9 | Claims in excess of 20 |
| 1201 | 84 | 2201 | 42 | Independent claims in excess of 3 |
| 1203 | 280 | 2203 | 140 | Multiple dependent claim, if not paid |
| 1204 | 84 | 2204 | 42 | ** Reissue independent claims over original patent |
| 1205 | 18 | 2205 | 9 | ** Reissue claims in excess of 20 and over original patent |

**SUBTOTAL (2)** ($)

***or number previously paid, if greater; For Reissues, see above*

## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description | Fee Paid |
|---|---|---|---|---|---|
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | - |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet | - |
| 1053 | 130 | 1053 | 130 | Non-English specification | - |
| 1812 | 2,520 | 1812 | 2,520 | For filing a request for *ex parte* reexamination | - |
| 1804 | 920* | 1804 | 920* | Requesting publication of SIR prior to Examiner action | - |
| 1805 | 1,840* | 1805 | 1,840* | Requesting publication of SIR after Examiner action | - |
| 1251 | 110 | 2251 | 55 | Extension for reply within first month | - |
| 1252 | 410 | 2252 | 205 | Extension for reply within second month | 930 |
| 1253 | 930 | 2253 | 465 | Extension for reply within third month | - |
| 1254 | 1,450 | 2254 | 725 | Extension for reply within fourth month | - |
| 1255 | 1,970 | 2255 | 985 | Extension for reply within fifth month | - |
| 1401 | 320 | 2401 | 160 | Notice of Appeal | - |
| 1402 | 320 | 2402 | 160 | Filing a brief in support of an appeal | - |
| 1403 | 280 | 2403 | 140 | Request for oral hearing | - |
| 1451 | 1,510 | 1451 | 1,510 | Petition to institute a public use proceeding | - |
| 1452 | 110 | 2452 | 55 | Petition to revive - unavoidable | - |
| 1453 | 1,300 | 2453 | 650 | Petition to revive - unintentional | - |
| 1501 | 1,300 | 2501 | 650 | Utility issue fee (or reissue) | - |
| 1502 | 470 | 2502 | 235 | Design issue fee | - |
| 1503 | 630 | 2503 | 315 | Plant issue fee | - |
| 1460 | 130 | 1460 | 130 | Petitions to the Commissioner | - |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17(q) | - |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | - |
| 8021 | 40 | 8021 | 40 | Recording each patent assignment per property (times number of properties) | - |
| 1809 | 750 | 2809 | 375 | Filing a submission after final rejection (37 CFR 1.129(a)) | - |
| 1810 | 750 | 2810 | 375 | For each additional invention to be examined (37 CFR 1.129(b)) | - |
| 1801 | 750 | 2801 | 375 | Request for Continued Examination (RCE) | - |
| 1802 | 900 | 1802 | 900 | Request for expedited examination of a design application | - |

Other fee (specify) :

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($) 930

(Complete *(if applicable)*)

| SUBMITTED BY | | | | | |
|---|---|---|---|---|---|
| *Name (Print/Type)* | Joan L. Simunic | *Registration No. (Attorney/Agent)* | 43,125 | *Telephone* | 502-634-7373 |
| *Signature* | | | | *Date* | September 23, 2003 |

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PTO/SB/22 (08-03)
Approved for use through 7/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE


# PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional) ZL494/01001

In re Application of X. D. Hu et al

Application Number 09/851,177 Filed May 8, 2001

For High Surface Area, . . .

Art Unit 1754 Examiner C. Nguyen

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

- ☐ One month (37 CFR 1.17(a)(1)) $_____
- ☐ Two months (37 CFR 1.17(a)(2)) $_____
- ☒ Three months (37 CFR 1.17(a)(3)) $ 930
- ☐ Four months (37 CFR 1.17(a)(4)) $_____
- ☐ Five months (37 CFR 1.17(a)(5)) $_____

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: $_____.

☐ A check in the amount of the fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

I have enclosed a duplicate copy of this sheet.

I am the ☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☒ attorney or agent of record. Registration Number 43,125

☐ attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

September 23, 2003
Date

Joan Simonic
Signature

502-634-7373
Telephone Number

Joan L. Simonic
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

PTO/SB/22 (08-03)
Approved for use through 7/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE


**PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)**

Docket Number (Optional) ZL494/01001

In re Application of X. D. Hu et al

Application Number 09/851,177 Filed May 8, 2001

For High Surface Area, . .

Art Unit 1754 Examiner C. Nguyen

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- ☐ One month (37 CFR 1.17(a)(1)) $_____
- ☐ Two months (37 CFR 1.17(a)(2)) $_____
- ☒ Three months (37 CFR 1.17(a)(3)) $ 930
- ☐ Four months (37 CFR 1.17(a)(4)) $_____
- ☐ Five months (37 CFR 1.17(a)(5)) $_____

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: $_____.

☐ A check in the amount of the fee is enclosed.

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☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

I have enclosed a duplicate copy of this sheet.

I am the ☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☒ attorney or agent of record. Registration Number 43,125

☐ attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

September 23, 2003
Date

Joan Simunic
Signature

502-634-7373
Telephone Number

Joan L. Simunic
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | | |
|---|---|---|
| Application Number | : | 09/851,177 |
| Applicants | : | X. D. Hu et al. |
| Filing Date | : | 05/08/2001 |
| TC/A.U. | : | 1754 |
| Examiner | : | Cam Nguyen |
| Attorney Docket No. | : | ZL494/01001 |
| Customer No. | : | |
| Title: | : | High Surface Area, Small Crystallite Size Catalyst for Fischer-Tropsch Synthesis |

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

**ADMENDMENT**

Sir:

In response to the Office Action mailed March 26, 2003, please amend the above-identified application as follows:

**Amendments to the Specification:** There are no changes are being made to the specification.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Amendments to the Drawings:** There are no changes are being made to the drawings.

**Remarks/Arguments** begin on page 6 of this paper.

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1. (currently amended) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising a catalyst particle, which comprises at least one metal that is an efficient carbon monoxide adsorber and at least one promoter~~, said metal and said promoter being~~ dispersed on a support to form ~~a~~ said catalyst particle, said particle having a BET surface area of from about 100 $m^2/g$ to about 250 $m^2/g$, and said metal and said promoter ~~being~~ are dispersed on the support such that the crystallite size of the metal oxide is from about 40 Å to about 200 Å, and said particle having an essentially smooth, homogeneous surface morphology.

Claim 2. (original) The catalyst of Claim 1 wherein said particle comprises from about 5 wt % to about 60 wt % cobalt, and from about 0.0001 wt % to about 1 wt % of a first promoter, and from about 0.01 wt % to about 5 wt % of a second promoter.

Claim 3. (original) The catalyst of Claim 2 wherein said particle comprises from about 10 wt% to about 30 wt % cobalt, and from about 0.01 wt % to about 0.05 wt % of said first promoter, and from about 0.1 wt % to about 1 wt % of said second promoter.

Claim 4. (original) The catalyst of Claim 1 wherein said metal is selected from the group consisting of nickel, cobalt, iron, ruthenium, osmium, platinum, palladium, iridium, rhenium, molybdenum, chromium, tungsten, vanadium, rhodium, copper, zinc, and combinations thereof.

Claim 5. (original) The catalyst of Claim 4 wherein said metal is cobalt.

Claim 6. (currently amended) The catalyst of Claim 1 wherein said promoter is selected from the group consisting of boron, cerium, chromium, copper, iridium, iron, lanthanum, manganese, molybdenum, palladium, platinum, rhenium, rhodium, ruthenium, strontium, tungsten, vanadium, zinc, sodium oxide, potassium oxide, rubidium oxide, cesium oxide, magnesium oxide, titanium oxide, zirconium oxide, ~~and other rare earth metals, such as~~ scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, other rare earth metals and combinations thereof.

Claim 7. (original) The catalyst of Claim 2 wherein said first promoter is selected from the group consisting of palladium, platinum, ruthenium, rhenium, rhodium, iridium and a combination thereof; and said second promoter is selected from the group consisting of potassium, boron, cesium, lanthanum, cerium, strontium, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, palladium, platinum, ruthenium, rhenium, rhodium, iridium and combinations thereof.

Claim 8. (original) The catalyst of Claim 1 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 9. (original) The catalyst of Claim 8 wherein said support is γ-alumina.

Claim 10. (original) The catalyst of Claim 9 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 11. (currently amended) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein said particle ~~being~~ is formed by the steps of:

a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;

b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;

c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is ~~essentially completely~~ reacted with said support;

d) separating said slurry into a solid portion and a liquor portion;

e) washing said solid portion with water;

f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and

g) reducing said catalyst particles by heating said particles ~~from ambient temperature~~ to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

Claim 12. (original) The catalyst of Claim 11 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 13. (original) The catalyst of Claim 12 wherein said support is aluminum oxide.

Claim 14. (original) The catalyst of Claim 12 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 15. (original) The catalyst of Claim 11 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 16. (currently amended) The catalyst of Claim 15 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water ~~molecules~~, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 17. (original) The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

Claim 18. (original) The catalyst of Claim 11 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 19. (original) The catalyst of Claim 11 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 20. (original) The catalyst of Claim 11 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 21. (original) The catalyst of Claim 11 wherein said particles are further stabilized to prevent pyrophoric reactions when said particles are in the presence of air.

Claim 22. (currently amended) The catalyst of Claim 21 wherein said particles are stabilized by ~~being coated~~ coating with oil.

Claim 23. (currently amended) The catalyst of Claim 11 further including at least one promoter, wherein said promoter ~~being~~ is added with said cobalt salt solution.

Claim 24. (original) The catalyst of Claim 23 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 25. (original) The catalyst of Claim 11 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claims 26 – 34. (canceled)

~~26. A method for making a catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, said method comprising:~~

~~a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;~~

~~b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;~~

~~c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is essentially completely reacted with said support;~~

~~d) separating said slurry into a solid portion and a liquor portion;~~

~~e) washing said solid portion with water;~~

~~f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and~~

~~g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.~~

~~27. The catalyst of Claim 26 wherein said support is aluminum oxide.~~

~~28. The catalyst of Claim 27 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.~~

~~29. The catalyst of Claim 26 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).~~

~~30. The catalyst of Claim 26 wherein said solid portion is dried at from about 120°C to about 260°C in step f).~~

~~31. The catalyst of Claim 26 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.~~

~~32. The catalyst of Claim 26 wherein said particles are further stabilized by being coated with oil.~~

~~33. The catalyst of Claim 26 further including at least one promoter, said promoter being added with said cobalt salt solution.~~

~~34. The catalyst of Claim 33 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.~~

Claim 35. (new) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, wherein said particle is formed by the steps of:

a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;

b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;

c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;

d) separating said slurry into a solid portion and a liquor portion;

e) washing said solid portion with water;

f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles;

g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours; and

h) stabilizing said particles to prevent pyrophoric reactions when said particles are in the presence of air by coating said particles with oil.

Claim 36. (new) The catalyst of Claim 35 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 37. (new) The catalyst of Claim 36 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 38. (new) The catalyst of Claim 35 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 39. (new) The catalyst of Claim 38 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 40. (new) The catalyst of Claim 35 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 41. (new) The catalyst of Claim 35 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 42. (new) The catalyst of Claim 35 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 43. (new) The catalyst of Claim 35 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 44. (new) The catalyst of Claim 43 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 45. (new) The catalyst of Claim 35 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 46. (new) The catalyst of Claim 35 wherein said support is aluminum oxide and said aqueous cobalt salt solution comprises water and hexaammine cobalt (II) carbonate.

*Attachment: Clean Unmarked Version of Claims Now in Application*

## REMARKS / ARGUMENTS

### *Remarks Regarding Informalities and Claims Rejected Under 35 USC §112*

Claims 1 – 25 remain in the application. Claims 35 – 46 have been added to the application and are presented for examination. Claims 26 – 34 have been withdrawn in response to a requirement by the Examiner that the claims be restricted to Claims 1 – 25, drawn to a catalyst, or to Claims 26 – 34, drawn to a process of preparing a catalyst. In view of the Examiner's earlier restriction requirement, applicant retains the right to present claims 26 – 34 in a divisional application.

The Examiner objected to claims 1, 11, 16, 22, and 23 because of noted informalities. As proposed by the Examiner, claims 1 and 11 have been reworded in lines 1 – 3. Further, as proposed by the Examiner: in claim 1, line 5, "being" has been replaced with "are"; in claim 11, line 2, "being" has been replaced with "is"; and, in claim 16, line 2, "molecules" has been deleted to retain consistency with the language of claim 15. Further formality amendments include: in claim 22, line 1, "being coated" has been deleted and replaced with "coating"; and in claim 23, line 2, "being" has been replaced with "is" and "wherein" has been added. The amendments of claim 22 and claim 23 were suggested by the Examiner but required further correction than proposed to have grammatically correct sentences after amendment. Finally, in claim 11, step (c), "essentially completely" has been deleted to address a concern raised by the Examiner with the original language. No new subject matter has been added in making these amendments.

The Examiner objected to claim 17 based on the failure to comply to 37 CFR 1.75(c). The applicant respectfully challenges this objection. Claim 17 depends from claim 16 which recites a cobalt (II) complex having "coordination sphere ligands selected from the group consisting of water, ammonia, ..." Claim 17 recites "The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate." As is known in the art, the "hexaammine cobalt (II) carbonate" coordination sphere ligands are ammonia, as recited in claim 16. The carbonate is not a coordination sphere ligand but rather a counterion to the positively charged cobalt ion. Thus, applicant requests the Examiner to reconsider his objection with respect to claim 17.

Claims 1 – 10 and 16 – 17 were rejected under 35 U.S.C. §112. The Examiner states that Claim 1 recites the limitation "the metal oxide" with insufficient antecedent basis for this limitation. The applicant respectfully notes that in the specification on page 4, lines 2 – 3, the catalyst has "a metal oxide crystallite size of from about 40 Å to about 200 Å." On page 12, lines 11 – 15, the metal oxide is more narrowly defined as the "cobalt oxide crystallite size" – and as is known in the art, cobalt is considered a metal when in reference to oxides – and the "cobalt oxide crystallite size ... is greater than about 40 Å diameter, and is preferably less than about 200 Å." Thus, applicant requests the Examiner to reconsider his objection under 35 U.S.C. §112 with respect to claim 1, and its dependent claims 2 – 10. If it would expedite matters, the applicant is willing to amend the paragraph on page 12 to include the more inclusive language of page 4 if so requested by the Examiner.

As noted by the Examiner, Claim 6 included the indefinite phrase "such as". Claim 6 has been amended to delete this phrase and should now be in allowable form.

As noted by the Examiner, Claim 16 included improper Markush terminology. Claim 16 has been amended to be consistent with the correct Markush phrase, and claim 16 and its dependent claim 17 should now be in allowable form.

***Remarks Regarding Allowable Subject Matter***

The Examiner has indicated that Claim 22 is objected to as being dependent on a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response to this rejection, new claim 35 is presented. New claim 35 includes the limitations of rejected independent claims 11 (preamble and steps a – g), rejected dependent claim 21 and objected to dependent claim 22 (step h). Claims 36 – 46 have been added as claims dependent on new independent claim 35. As amended, independent claim 35 is believed to now be in allowable form. Because they depend from an allowable claim, dependent claims 36 – 46 are also believed to now be in allowable form.

The Examiner has also indicated that claims 1 – 10 would be allowable if the 35 U.S.C. §112 rejection is overcome. As noted in the prior section, page 4, lines 2 – 3, of the specification teach a catalyst that has "a metal oxide crystallite size of from about 40 Å to about 200 Å" and page 12, lines 11 – 15, of the specification teach "cobalt oxide crystallite size ... greater than about 40 Å diameter, and is preferably less than about 200 Å." Applicant is willing to amend the paragraph on page 12 to include the more inclusive language of page 4 if so requested by the Examiner.

***Remarks Regarding Citations***

Applicant has made note of the prior art recited by the Examiner in Paragraph 15 of his Office Action mailed March 26, 2003.

***Remarks Regarding Claims Rejected Under 35 USC §102(b) and 35 USC §103(a)***

The Examiner has rejected independent claim 11 and dependent claims 12, 14 – 21, 23 and 25 under 35 U.S.C 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Shen et al, U.S. Patent 5,962,367 ("the '367 patent"). Applicant respectfully traverses both rejections.

The Examiner has further rejected independent claim 11 and dependent Claims 12 – 13, 15 – 21 and 23 – 25 under 35 U.S.C 102(b) as anticipated by or in the alternative, under 35 U.S.C. 103(a) as obvious over Sapienza et al., U.S. Patent 4,396,539 ("the '539 patent"). Applicant respectfully traverses both rejections.

*Summary of the Present Invention*

The Fischer-Tropsch catalyst of the present invention is a transition metal-based catalyst having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support, and a small metal oxide crystallite size. In a first embodiment, the catalyst has a surface area of from about 100 $m^2/g$ to about 250 $m^2/g$; an essentially smooth, homogeneous surface morphology; an essentially uniform distribution of metal throughout an essentially inert support; and a metal oxide crystallite size of from about 40 Å to about 200 Å. Optionally, the catalyst may further comprise at least one promoter.

The Fischer-Tropsch catalyst of independent claim 11 of the present application, as amended, is a catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein the particle is formed by several prescribed steps. Claims 12 – 25 of the present application depend from independent claim 11.

As provided in dependent claim 14, the catalyst of claim 11 may be prepared from a support having a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm. However, as discussed on page 28, line 1 through page 29, line 4 and as shown in Figures 1A – 4, two catalysts prepared with the same support material can have significantly different physical characteristics depending upon the process used to make the catalyst. (*N.B.*: In the examples of the present applciation each catalyst was prepared using a Puralox SCCa 5/150 support having a surface area of about 160 $m^2/g$, a pore volume of about 0.50 ml/g, and a pore diameter of about 12.55 nm.) The steps outlined in independent claim 11 result in a catalyst particle having the desired physical characteristics. Prior art methods of catalyst particle preparation, even starting with the same support, do not result in the catalyst particle of the present invention.

*Summary of U.S. Patent 5,962,367, Shen et al.*

U.S. Patent 5,962,367 teaches a process for preparing a catalyst support primarily formed of titania. The catalyst support comprises 60 wt% to 100 wt % titania as $TiO_2$ and 0 wt% to 40 wt % alumina as $Al_2O_3$. As noted by the Examiner, the '367 patent teaches a cobalt molybdate catalyst supported on a titania support, wherein the support has a surface area ranging from 80 $m^2/g$ to 200 $m^2/g$, a pore volume of from about 0.3 ml/g to about 0.5 ml/g, and a pore diameter of from about 6 nm to about 20 nm.

The '367 patent then teaches using this catalyst support to prepare a cobalt molybdate catalyst using an impregnation process. At column 5, lines 6 – 8, the '367 states "the dynamic co-impregnation

method is used for supporting the cobalt and molybdenum active components ..." In Examples 4 – 7, the support is "immersed into the impregnating solution ..." for the preparation of the catalyst.

However, the '367 patent does not teach or suggest that the catalyst resulting from the impregnation process using the '367 titania support has a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size as is seen with the preparation process of the present invention. Rather, there is nothing in the '367 patent that suggests that the physical characteristics of the cobalt molybdate catalyst prepared by the impregnation process would be any different than the catalysts prepared by the prior art impregnation method and reported in Example 6 (and Figures 2A, 2B and 4) of the present application. Further, the catalyst of the present invention made by the process of instant claim 11 would not be anticipated or obvious merely because a titania support is used, or the physical characteristics of the support are similar to supports of the prior art, or because a promoter is added. Thus, independent claim 11 and its dependent claims 12 – 25 are not anticipated nor obvious in view of U.S. Patent 5,962,367.

*Summary of U.S. Patent 4,396,539, Sapienza et al.*

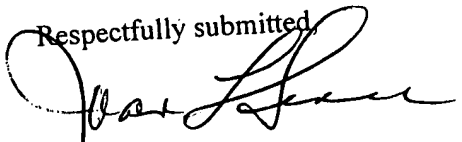
U.S. Patent 4,396,539 teaches a process for preparing a catalyst suitable for Fischer-Tropsch synthesis wherein the catalyst is composed of palladium or platinum and cobalt supported on a solid support. More specifically, the '539 patent teaches an alumina, silica gel, kieselguhr, or zinc oxide support that is impregnated by immersion of the support in an aqueous solution of the salt of a palladium or platinum metal. The palladium- or platinum-treated support is then immersed in a solution containing primarily cobalt.

The objective of the process set forth in the '539 patent is to achieve a catalyst particle with the metal loading as a coating around the support. The catalyst structure depicted in Figure 5 is believed to "best represent the idealized structure of this catalyst" (column 4, lines 9 – 21). By contrast, the process of claim 11 of the present invention produces a catalyst that has "an essentially uniform distribution of cobalt throughout the support". In other words, the process taught in the '539 patent teaches away from the desired product of the present invention. Thus, independent claim 11 and its dependent claims 12 – 25 are not anticipated nor obvious in view of U.S. Patent 4,396,539.

Because U.S. Patent 5,962,367 and U.S. Patent 4,396,539 each teach a process for preparing a catalyst that relies on impregnation to deliver the metal to the support, the product-by-process taught by the amended claim 11 of the present application is neither anticipated nor obvious. Thus, applicant respectfully requests that the §102(b) and the §103(a) rejections be withdrawn and that independent claim 11, as amended, and its dependent claims 12 – 25, be allowed.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,



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**Clean Unmarked Version of Claims Now in Application**

Claim 1. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising a catalyst particle, which comprises at least one metal that is an efficient carbon monoxide adsorber and at least one promoter dispersed on a support to form said catalyst particle, said particle having a BET surface area of from about 100 $m^2/g$ to about 250 $m^2/g$, and said metal and said promoter are dispersed on the support such that the crystallite size of the metal oxide is from about 40 Å to about 200 Å, and said particle having an essentially smooth, homogeneous surface morphology.

Claim 2. The catalyst of Claim 1 wherein said particle comprises from about 5 wt % to about 60 wt % cobalt, and from about 0.0001 wt % to about 1 wt % of a first promoter, and from about 0.01 wt % to about 5 wt % of a second promoter.

Claim 3. The catalyst of Claim 2 wherein said particle comprises from about 10 wt% to about 30 wt % cobalt, and from about 0.01 wt % to about 0.05 wt % of said first promoter, and from about 0.1 wt % to about 1 wt % of said second promoter.

Claim 4. The catalyst of Claim 1 wherein said metal is selected from the group consisting of nickel, cobalt, iron, ruthenium, osmium, platinum, palladium, iridium, rhenium, molybdenum, chromium, tungsten, vanadium, rhodium, copper, zinc, and combinations thereof.

Claim 5. The catalyst of Claim 4 wherein said metal is cobalt.

Claim 6. The catalyst of Claim 1 wherein said promoter is selected from the group consisting of boron, cerium, chromium, copper, iridium, iron, lanthanum, manganese, molybdenum, palladium, platinum, rhenium, rhodium, ruthenium, strontium, tungsten, vanadium, zinc, sodium oxide, potassium oxide, rubidium oxide, cesium oxide, magnesium oxide, titanium oxide, zirconium oxide, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, other rare earth metals and combinations thereof.

Claim 7. The catalyst of Claim 2 wherein said first promoter is selected from the group consisting of palladium, platinum, ruthenium, rhenium, rhodium, iridium and a combination thereof; and said second promoter is selected from the group consisting of potassium, boron, cesium, lanthanum, cerium, strontium, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, palladium, platinum, ruthenium, rhenium, rhodium, iridium and combinations thereof.

Claim 8. The catalyst of Claim 1 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 9. The catalyst of Claim 8 wherein said support is γ-alumina.

Claim 10. The catalyst of Claim 9 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 11. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein said particle is formed by the steps of:

a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;

b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;

c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;

d) separating said slurry into a solid portion and a liquor portion;

e) washing said solid portion with water;

f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and

g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

Claim 12. The catalyst of Claim 11 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 13. The catalyst of Claim 12 wherein said support is aluminum oxide.

Claim 14. The catalyst of Claim 12 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 15. The catalyst of Claim 11 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 16. The catalyst of Claim 15 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 17. The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

Claim 18. The catalyst of Claim 11 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 19. The catalyst of Claim 11 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 20. The catalyst of Claim 11 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 21. The catalyst of Claim 11 wherein said particles are further stabilized to prevent pyrophoric reactions when said particles are in the presence of air.

Claim 22. The catalyst of Claim 21 wherein said particles are stabilized by coating with oil.

Claim 23. The catalyst of Claim 11 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 24. The catalyst of Claim 23 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 25. The catalyst of Claim 11 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 35. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, wherein said particle is formed by the steps of:

a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;

b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;

c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;

d) separating said slurry into a solid portion and a liquor portion;

e) washing said solid portion with water;

f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles;

g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours; and

h) stabilizing said particles to prevent pyrophoric reactions when said particles are in the presence of air by coating said particles with oil.

Claim 36. The catalyst of Claim 35 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 37. The catalyst of Claim 36 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 38. The catalyst of Claim 35 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 39. The catalyst of Claim 38 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 40. The catalyst of Claim 35 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 41. The catalyst of Claim 35 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 42. The catalyst of Claim 35 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 43. The catalyst of Claim 35 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 44. The catalyst of Claim 43 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 45. The catalyst of Claim 35 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 46. The catalyst of Claim 35 wherein said support is aluminum oxide and said aqueous cobalt salt solution comprises water and hexaammine cobalt (II) carbonate.

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Examiner: Cam Nguyen Group: 1754
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FROM: Joan L.Simunic Reg. No. 42,125

DATE: September 24, 2003

PAGES: 20 in total (including cover sheet)

RE: U.S. Patent Application No.09/851,177

Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003

Enclosed are:

(1) Transmittal Form.
(2) Fee Transmittal for FY 2003
(3) Credit Card Payment Form
(4) Petition for Extension of Time
(5) Response to Office Action
(6) Clean Unmarked Version of Claims Now in Application

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Donna Ferrill — Person Signing
Signature
9/24/03 — Date

Received from <502 634 7661> at 9/24/03 8:36:34 AM [Eastern Daylight Time]

PTO/SB/17 (08-03)
App. for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


# FEE TRANSMITTAL for FY 2003

*Effective 01/01/2003. Patent fees are subject to annual revision.*

☐ Applicant claims small entity status. See 37 CFR 1.27

**TOTAL AMOUNT OF PAYMENT** ($) 930.00

| Complete if Known | |
|---|---|
| Application Number | 09/851,177 |
| Filing Date | May 8, 2001 |
| First Named Inventor | X. D. Hu |
| Examiner Name | Cam Nguyen |
| Art Unit | 1754 |
| Attorney Docket No. | ZL 494/01001 |

## METHOD OF PAYMENT *(check all that apply)*

☐ Check ☑ Credit card ☐ Money Order ☐ Other ☐ None

☐ Deposit Account:

Deposit Account Number
Deposit Account Name

**The Director is authorized to:** *(check all that apply)*

☐ Charge fee(s) indicated below ☐ Credit any overpayments

☐ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

## FEE CALCULATION

### 1. BASIC FILING FEE

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description | Fee Paid |
|---|---|---|---|---|---|
| 1001 | 750 | 2001 | 375 | Utility filing fee | |
| 1002 | 330 | 2002 | 165 | Design filing fee | |
| 1003 | 520 | 2003 | 260 | Plant filing fee | |
| 1004 | 750 | 2004 | 375 | Reissue filing fee | |
| 1005 | 160 | 2005 | 80 | Provisional filing fee | |

**SUBTOTAL (1)** ($) n/a

### 2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

| | Extra Claims | | Fee from below | Fee Paid |
|---|---|---|---|---|
| Total Claims | | -20** = | X | = |
| Independent Claims | | - 3** = | X | = |
| Multiple Dependent | | | | = |

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description |
|---|---|---|---|---|
| 1202 | 18 | 2202 | 9 | Claims in excess of 20 |
| 1201 | 84 | 2201 | 42 | Independent claims in excess of 3 |
| 1203 | 280 | 2203 | 140 | Multiple dependent claim, if not paid |
| 1204 | 84 | 2204 | 42 | ** Reissue independent claims over original patent |
| 1205 | 18 | 2205 | 9 | ** Reissue claims in excess of 20 and over original patent |

**SUBTOTAL (2)** ($)

***or number previously paid, if greater; For Reissues, see above*

## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description | Fee Paid |
|---|---|---|---|---|---|
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | - |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet | - |
| 1053 | 130 | 1053 | 130 | Non-English specification | - |
| 1812 | 2,520 | 1812 | 2,520 | For filing a request for *ex parte* reexamination | - |
| 1804 | 920* | 1804 | 920* | Requesting publication of SIR prior to Examiner action | - |
| 1805 | 1,840* | 1805 | 1,840* | Requesting publication of SIR after Examiner action | - |
| 1251 | 110 | 2251 | 55 | Extension for reply within first month | - |
| 1252 | 410 | 2252 | 205 | Extension for reply within second month | 930 |
| 1253 | 930 | 2253 | 465 | Extension for reply within third month | - |
| 1254 | 1,450 | 2254 | 725 | Extension for reply within fourth month | - |
| 1255 | 1,970 | 2255 | 985 | Extension for reply within fifth month | - |
| 1401 | 320 | 2401 | 160 | Notice of Appeal | - |
| 1402 | 320 | 2402 | 160 | Filing a brief in support of an appeal | - |
| 1403 | 280 | 2403 | 140 | Request for oral hearing | - |
| 1451 | 1,510 | 1451 | 1,510 | Petition to institute a public use proceeding | - |
| 1452 | 110 | 2452 | 55 | Petition to revive - unavoidable | - |
| 1453 | 1,300 | 2453 | 650 | Petition to revive - unintentional | - |
| 1501 | 1,300 | 2501 | 650 | Utility issue fee (or reissue) | - |
| 1502 | 470 | 2502 | 235 | Design issue fee | - |
| 1503 | 630 | 2503 | 315 | Plant issue fee | - |
| 1460 | 130 | 1460 | 130 | Petitions to the Commissioner | - |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17(q) | - |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | - |
| 8021 | 40 | 8021 | 40 | Recording each patent assignment per property (times number of properties) | - |
| 1809 | 750 | 2809 | 375 | Filing a submission after final rejection (37 CFR 1.129(a)) | - |
| 1810 | 750 | 2810 | 375 | For each additional invention to be examined (37 CFR 1.129(b)) | - |
| 1801 | 750 | 2801 | 375 | Request for Continued Examination (RCE) | - |
| 1802 | 900 | 1802 | 900 | Request for expedited examination of a design application | - |

Other fee (specify) -

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($) 930

(Complete *(if applicable)*)

| SUBMITTED BY | | | | | |
|---|---|---|---|---|---|
| *Name (Print/Type)* | Joan L. Simunic | *Registration No. (Attorney/Agent)* | 43,125 | *Telephone* | 502-634-7373 |
| *Signature* | | | | *Date* | September 23, 2003 |

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**



*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

PTO/SB/22 (08-03)
Approved for use through 7/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE


| PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) | Docket Number (Optional) TL494/01001 |
|---|---|

| | |
|---|---|
| In re Application of | X. D. Hu et al |
| Application Number 09/851,177 | Filed May 8, 2001 |
| For | High Surface Area, ... |
| Art Unit 1754 | Examiner C. Nguyen |

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

- ☐ One month (37 CFR 1.17(a)(1)) $_____
- ☐ Two months (37 CFR 1.17(a)(2)) $_____
- ☒ Three months (37 CFR 1.17(a)(3)) $ 930
- ☐ Four months (37 CFR 1.17(a)(4)) $_____
- ☐ Five months (37 CFR 1.17(a)(5)) $_____

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: $_____.

☐ A check in the amount of the fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

I have enclosed a duplicate copy of this sheet.

I am the
- ☐ applicant/inventor.
- ☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
- ☒ attorney or agent of record. Registration Number 43,125
- ☐ attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

September 23, 2003
Date

Joan Simonic
Signature

502-634-7373
Telephone Number

Joan L. Simonic
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

PTO/SB/22 (08-03)
Approved for use through 7/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE


| PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) | Docket Number (Optional) ZL494/01001 |
|---|---|

| | |
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| In re Application of | X. D. Hu et al |
| Application Number 09/851,177 | Filed May 8, 2001 |
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- ☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
- ☒ attorney or agent of record. Registration Number 43,125
- ☐ attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

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September 23, 2003
Date

Joan Simonic
Signature

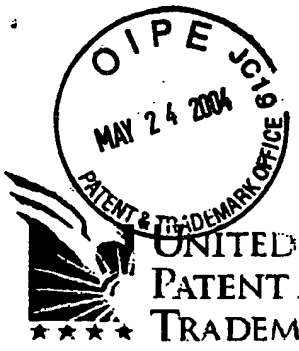
502-634-7373
Telephone Number

Joan L. Simonic
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

TO:Auto-reply fax to 02 634 7661 COMPANY:




# Auto-Reply Facsimile Transmission

UNITED STATES PATENT AND TRADEMARK OFFICE

| | |
|---|---|
| TO: | Fax Sender at 502 634 7661 |
| Fax Information | |
| Date Received: | 9/24/03 8:36:34 AM [Eastern Daylight Time] |
| Total Pages: | 20 (including cover page) |

*ADVISORY: This is an automatically generated return receipt confirmation of the facsimile transmission received by the Office. Please check to make sure that the number of pages listed as received in Total Pages above matches what was intended to be sent. Applicants are advised to retain this receipt in the unlikely event that proof of this facsimile transmission is necessary. Applicants are also advised to use the certificate of facsimile transmission procedures set forth in 37 CFR 1.8(a) and (b), 37 CFR 1.6(f). Trademark Applicants, also see the Trademark Manual of Examining Procedure (TMEP) section 306 et seq.*

Received Cover Page ========>

09/24/03 WED 07:47 FAX 502 634 7661 HUMAN RESOURCES 001

Süd-Chemie Inc.
1600 West Hill Street
Louisville, Kentucky 40210

PHONE: (502) 634-7373
FAX: (502) 634-7724

CONFIDENTIAL AND PRIVILEGED
ATTORNEY CLIENT COMMUNICATION



TO: U.S. Patent and Trademark Office
Examiner: Cam Nguyen Group: 1754
Fax #703-872-9310

FROM: Joan L.Simunic Reg. No. 42,125

DATE: September 24, 2003

PAGES: 20 in total (including cover sheet)

RE: U.S. Patent Application No.09/851,177

Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003

Enclosed are:

(1) Transmittal Form.
(2) Fee Transmittal for FY 2003
(3) Credit Card Payment Form
(4) Petition for Extension of Time
(5) Response to Office Action
(6) Clean Unmarked Version of Claims Now in Application

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Corna Ferrill 9/24/03
Person Signing Signature Date

Received from <502 634 7661> at 9/24/03 8:36:34 AM [Eastern Daylight Time]

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/851,177 | 05/08/2001 | X.D. Hu | ZL494/01001 | 2722 |

22884 7590 11/18/2003

MIDDLETON & REUTLINGER
2500 BROWN & WILLIAMSON TOWER
LOUISVILLE, KY 40202

| EXAMINER | |
|---|---|
| NGUYEN, CAM N | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1754 | 7 |

DATE MAILED: 11/18/2003



Please find below and/or attached an Office communication concerning this application or proceeding.

- Notice of Abandonment -

# Notice of Abandonment

| Application No. | Applicant(s) |
|---|---|
| 09/851,177 | Hu et al. |
| **Examiner** | **Art Unit** |
| Cam Nguyen | 1754 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on *Mar 26, 2003* .

   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____ ), which is after the expiration of the period for reply (including a total extension of time of ___ month(s)) which expired on _____ .

   (b) ☐ A proposed reply was received on _____ , but it does not constitute a proper reply under 37 CFR 1.113(a) to the final rejection.

   (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).

   (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).

   (d) ☒ No reply has been received.

2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).

   (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____ ), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).

   (b) ☐ The submitted issue fee of $_____ is insufficient. A balance of $_____ is due.

   The issue fee required by 37 CFR 1.18 is $_____ . The publication fee, if required by 37 CFR 1.18(d) is $_____

   (c) ☐ The issue fee and publication fee, if applicable, has not been received.

3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).

   (a) ☐ Proposed new formal drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____ ), which is after the expiration of the period for reply.

   (b) ☐ No corrected drawings have been received.

4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.

5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.

6. ☐ The decision by the Board of Patent Appeals and Interferences rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.

7. ☐ The reason(s) below:

Cam Nguyen
11/17/03

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**
**Washington, D.C., United States of America**

In re Application of HU, X.D.; et al.

Serial No.: 09/851,177

Filed: 05/08/2001

For: HIGH SURFACE AREA, SMALL CRYSTALLITE SIZE CATALYST FOR FISCHER-TROPSCH SYNTHESIS

Mail Stop Non-Fee
Director of Technology Center Art Unit 1754
P.O. Box 1450
Alexandria, VA 22313-1450

**CERTIFICATE OF TRANSMISSION UNDER 37 CFR 1.8 (b)**

Dear Sir:

We kindly request the United States Patent Office to consider the enclosed response to the 3/26/03 office action timely filed as it was faxed on September 24, 2003 and can be evidenced by the Auto-Reply Facsimile Transmission report.

In accordance with 37 CFR 1.8 (b), we are promptly informing the Office we previously transmitted by fax a response to the office action with mailing date of 03/26/03. I hereby state the response was sent by fax on 9/24/03 by Donna Ferrill.

We have included an additional copy of the response as well as the copy of the sending unit's report confirming transmission.

Respectfully submitted,

Joan Simunic, Reg. No. 43,125
Süd-Chemie Inc.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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22884 7590 11/18/2003

MIDDLETON & REUTLINGER
2500 BROWN & WILLIAMSON TOWER
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| EXAMINER | |
|---|---|
| NGUYEN, CAM N | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1754 | 7 |

DATE MAILED: 11/18/2003





Please find below and/or attached an Office communication concerning this application or proceeding.

- Notice of Abandonment -

# Notice of Abandonment



| Application No. | Applicant(s) |
|---|---|
| 09/851,177 | Hu et al. |
| **Examiner** | **Art Unit** |
| Cam Nguyen | 1754 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on *Mar 26, 2003* .

   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____ ), which is after the expiration of the period for reply (including a total extension of time of ____ month(s)) which expired on _____ .

   (b) ☐ A proposed reply was received on _____ , but it does not constitute a proper reply under 37 CFR 1.113(a) to the final rejection.

   (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).

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   The issue fee required by 37 CFR 1.18 is $_____ . The publication fee, if required by 37 CFR 1.18(d) is $_____

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   (a) ☐ Proposed new formal drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____ ), which is after the expiration of the period for reply.

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4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.

5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.

6. ☐ The decision by the Board of Patent Appeals and Interferences rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.

7. ☐ The reason(s) below:

Cam Nguyen
11/17/03

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

TO:Auto-reply fax to 502 634 7661 COMPANY:



# Auto-Reply Facsimile Transmission

UNITED STATES PATENT AND TRADEMARK OFFICE

TO: Fax Sender at 502 634 7661

Fax Information
Date Received: 9/24/03 8:36:34 AM [Eastern Daylight Time]
Total Pages: 20 (including cover page)

*ADVISORY: This is an automatically generated return receipt confirmation of the facsimile transmission received by the Office. Please check to make sure that the number of pages listed as received in Total Pages above matches what was intended to be sent. Applicants are advised to retain this receipt in the unlikely event that proof of this facsimile transmission is necessary. Applicants are also advised to use the certificate of facsimile transmission procedures set forth in 37 CFR 1.8(a) and (b), 37 CFR 1.6(f). Trademark Applicants, also see the Trademark Manual of Examining Procedure (TMEP) section 306 et seq.*

Received Cover Page =======>

09/24/03 WED 07:47 FAX 502 634 7661 HUMAN RESOURCES 001

Süd-Chemie Inc.
1600 West Hill Street
Louisville, Kentucky 40210

PHONE: (502) 634-7373
FAX: (502) 634-7724

CONFIDENTIAL AND PRIVILEGED
ATTORNEY CLIENT COMMUNICATION

The information contained in this facsimile message is the property of Süd-Chemie Inc. If you are not the intended recipient of this information, any disclosure, copying, distribution, or the taking of any action in reliance on this information, is strictly prohibited. If you have received this message in error, please notify us immediately to arrange for its return. Thank you.

TO: U.S. Patent and Trademark Office
Examiner: Cam Nguyen Group: 1754
Fax #703-872-9310

FROM: Joan L.Simunic Reg. No. 43,125

DATE: September 24, 2003

PAGES: 20 in total (including cover sheet)

RE: U.S. Patent Application No.09/851,177

Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003

Enclosed are:

(1) Transmittal Form.
(2) Fee Transmittal for FY 2003
(3) Credit Card Payment Form
(4) Petition for Extension of Time
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(6) Clean Unmarked Version of Claims Now in Application

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Donna Ferrill 9/24/03
Person Signing Signature Date

Received from <502 634 7661> at 9/24/03 8:36:34 AM [Eastern Daylight Time]


**Süd-Chemie Inc.**
**1600 West Hill Street**
**Louisville, Kentucky 40210**

**PHONE: (502) 634-7373**
**FAX: (502) 634-7724**

**CONFIDENTIAL AND PRIVILEGED**
**ATTORNEY CLIENT COMMUNICATION**



TO: U.S. Patent and Trademark Office
Examiner: Cam Nguyen Group: 1754
Fax **#703-872-9306**

FROM: Joan L.Simunic Reg. No. 43,125

DATE: September 24, 2003

PAGES: 20 in total (including cover sheet)

RE: U.S. Patent Application No.09/851,177

Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003

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Donna Ferrill
Person Signing

Signature

9/24/03
Date

PTO/SB/21 (08-03)
Approved for use through 08/30/2003. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


# TRANSMITTAL FORM

*(to be used for all correspondence after initial filing)*

| | |
|---|---|
| Application Number | 09/851,177 |
| Filing Date | May 8, 2001 |
| First Named Inventor | X. D. Hu |
| Art Unit | 1754 |
| Examiner Name | Cam Nguyen |
| Total Number of Pages in This Submission: 20 | Attorney Docket Number: ZL 494/01001 |

## ENCLOSURES *(Check all that apply)*

- [x] Fee Transmittal Form
- [x] Fee Attached
- [x] Amendment/Reply
- [ ] After Final
- [ ] Affidavits/declaration(s)
- [x] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
- [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
- [ ] After Allowance communication to Technology Center (TC)
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please Identify below):

Postcard

Remarks

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

| | |
|---|---|
| Firm or Individual name | Joan L. Simunic, Reg. 43,125 |
| Signature | Joan Simunic |
| Date | September 23, 2003 |

## CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

| | | | |
|---|---|---|---|
| Typed or printed name | Donna Fornill | | |
| Signature | Donna Fornill | Date | September 24, 2003 |

PTO/SB/17 (08-03)
Approved for ... through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


# FEE TRANSMITTAL for FY 2003

*Effective 01/01/2003. Patent fees are subject to annual revision.*

☐ Applicant claims small entity status. See 37 CFR 1.27

**TOTAL AMOUNT OF PAYMENT** ($) 930.00

| *Complete if Known* | |
|---|---|
| Application Number | 09/851,177 |
| Filing Date | May 8, 2001 |
| First Named Inventor | X. D. Hu |
| Examiner Name | Cam Nguyen |
| Art Unit | 1754 |
| Attorney Docket No. | ZL 494/01001 |

## METHOD OF PAYMENT *(check all that apply)*

☐ Check ☑ Credit card ☐ Money Order ☐ Other ☐ None

☐ Deposit Account:

Deposit Account Number

Deposit Account Name

**The Director is authorized to:** *(check all that apply)*

☐ Charge fee(s) indicated below ☐ Credit any overpayments

☐ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

## FEE CALCULATION

### 1. BASIC FILING FEE

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description | Fee Paid |
|---|---|---|---|---|---|
| 1001 | 750 | 2001 | 375 | Utility filing fee | |
| 1002 | 330 | 2002 | 165 | Design filing fee | |
| 1003 | 520 | 2003 | 260 | Plant filing fee | |
| 1004 | 750 | 2004 | 375 | Reissue filing fee | |
| 1005 | 160 | 2005 | 80 | Provisional filing fee | |

**SUBTOTAL (1)** ($) n/a

### 2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

| | Extra Claims | | Fee from below | | Fee Paid |
|---|---|---|---|---|---|
| Total Claims | | -20** = | | X | = |
| Independent Claims | | - 3** = | | X | = |
| Multiple Dependent | | | | | = |

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description |
|---|---|---|---|---|
| 1202 | 18 | 2202 | 9 | Claims in excess of 20 |
| 1201 | 84 | 2201 | 42 | Independent claims in excess of 3 |
| 1203 | 280 | 2203 | 140 | Multiple dependent claim, if not paid |
| 1204 | 84 | 2204 | 42 | ** Reissue independent claims over original patent |
| 1205 | 18 | 2205 | 9 | ** Reissue claims in excess of 20 and over original patent |

**SUBTOTAL (2)** ($)

***or number previously paid, if greater; For Reissues, see above*

## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description | Fee Paid |
|---|---|---|---|---|---|
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet | |
| 1053 | 130 | 1053 | 130 | Non-English specification | |
| 1812 | 2,520 | 1812 | 2,520 | For filing a request for *ex parte* reexamination | |
| 1804 | 920* | 1804 | 920* | Requesting publication of SIR prior to Examiner action | |
| 1805 | 1,840* | 1805 | 1,840* | Requesting publication of SIR after Examiner action | |
| 1251 | 110 | 2251 | 55 | Extension for reply within first month | |
| 1252 | 410 | 2252 | 205 | Extension for reply within second month | |
| 1253 | 930 | 2253 | 465 | Extension for reply within third month | 930 |
| 1254 | 1,450 | 2254 | 725 | Extension for reply within fourth month | |
| 1255 | 1,970 | 2255 | 985 | Extension for reply within fifth month | |
| 1401 | 320 | 2401 | 160 | Notice of Appeal | |
| 1402 | 320 | 2402 | 160 | Filing a brief in support of an appeal | |
| 1403 | 280 | 2403 | 140 | Request for oral hearing | |
| 1451 | 1,510 | 1451 | 1,510 | Petition to institute a public use proceeding | |
| 1452 | 110 | 2452 | 55 | Petition to revive - unavoidable | |
| 1453 | 1,300 | 2453 | 650 | Petition to revive - unintentional | |
| 1501 | 1,300 | 2501 | 650 | Utility issue fee (or reissue) | |
| 1502 | 470 | 2502 | 235 | Design issue fee | |
| 1503 | 630 | 2503 | 315 | Plant issue fee | |
| 1460 | 130 | 1460 | 130 | Petitions to the Commissioner | |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17(q) | |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | |
| 8021 | 40 | 8021 | 40 | Recording each patent assignment per property (times number of properties) | |
| 1809 | 750 | 2809 | 375 | Filing a submission after final rejection (37 CFR 1.129(a)) | |
| 1810 | 750 | 2810 | 375 | For each additional invention to be examined (37 CFR 1.129(b)) | |
| 1801 | 750 | 2801 | 375 | Request for Continued Examination (RCE) | |
| 1802 | 900 | 1802 | 900 | Request for expedited examination of a design application | |

Other fee (specify) :

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($) 930

## SUBMITTED BY

*(Complete (if applicable))*

| | | | | | |
|---|---|---|---|---|---|
| *Name (Print/Type)* | Jean L. Simunic | *Registration No. (Attorney/Agent)* | 43,125 | *Telephone* | 502-634-7373 |
| *Signature* | | | | *Date* | September 23, 2003 |

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PTO/SB/22 (08-03)
Approved for use through 7/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE
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**PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)**

Docket Number (Optional) ZL494/01001

In re Application of X. D. Hu et al

Application Number 09/851,177 Filed May 8, 2001

For High Surface Area, . . .

Art Unit 1754 Examiner C. Nguyen

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

- ☐ One month (37 CFR 1.17(a)(1)) $_____
- ☐ Two months (37 CFR 1.17(a)(2)) $_____
- ☒ Three months (37 CFR 1.17(a)(3)) $ 930
- ☐ Four months (37 CFR 1.17(a)(4)) $_____
- ☐ Five months (37 CFR 1.17(a)(5)) $_____

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: $_____.

☐ A check in the amount of the fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

I have enclosed a duplicate copy of this sheet.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☒ attorney or agent of record. Registration Number 43,125

☐ attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

September 23, 2003
Date

Joan Simonic
Signature

502-634-7373
Telephone Number

Joan L. Simonic
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

PTO/SB/22 (08-03)
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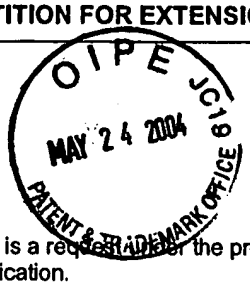
| PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) | Docket Number (Optional) ZL494/01001 |
|---|---|




| | |
|---|---|
| In re Application of | X. D. Hu et al |
| Application Number 09/851,177 | Filed May 8, 2001 |
| For | High Surface Area, ... |
| Art Unit 1754 | Examiner C. Nguyen |

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

- ☐ One month (37 CFR 1.17(a)(1)) $_____
- ☐ Two months (37 CFR 1.17(a)(2)) $_____
- ☒ Three months (37 CFR 1.17(a)(3)) $ 930
- ☐ Four months (37 CFR 1.17(a)(4)) $_____
- ☐ Five months (37 CFR 1.17(a)(5)) $_____

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: $_____.

☐ A check in the amount of the fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

I have enclosed a duplicate copy of this sheet.

I am the
- ☐ applicant/inventor.
- ☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
- ☒ attorney or agent of record. Registration Number 43,125
- ☐ attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

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September 23, 2003
Date

Joan Simunic
Signature

502-634-7373
Telephone Number

Joan L. Simunic
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | | |
|---|---|---|
| Application Number | : | 09/851,177 |
| Applicants | : | X. D. Hu et al. |
| Filing Date | : | 05/08/2001 |
| TC/A.U. | : | 1754 |
| Examiner | : | Cam Nguyen |
| Attorney Docket No. | : | ZL494/01001 |
| Customer No. | : | |
| Title: | : | High Surface Area, Small Crystallite Size Catalyst for Fischer-Tropsch Synthesis |

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

## ADMENDMENT

Sir:

In response to the Office Action mailed March 26, 2003, please amend the above-identified application as follows:

**Amendments to the Specification:** There are no changes are being made to the specification.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Amendments to the Drawings:** There are no changes are being made to the drawings.

**Remarks/Arguments** begin on page 6 of this paper.

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1. (currently amended) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising a catalyst particle, which comprises at least one metal that is an efficient carbon monoxide adsorber and at least one promoter~~, said metal and said promoter being~~ dispersed on a support to form ~~a~~ said catalyst particle, said particle having a BET surface area of from about 100 $m^2/g$ to about 250 $m^2/g$, and said metal and said promoter ~~being~~ are dispersed on the support such that the crystallite size of the metal oxide is from about 40 Å to about 200 Å, and said particle having an essentially smooth, homogeneous surface morphology.

Claim 2. (original) The catalyst of Claim 1 wherein said particle comprises from about 5 wt % to about 60 wt % cobalt, and from about 0.0001 wt % to about 1 wt % of a first promoter, and from about 0.01 wt % to about 5 wt % of a second promoter.

Claim 3. (original) The catalyst of Claim 2 wherein said particle comprises from about 10 wt% to about 30 wt % cobalt, and from about 0.01 wt % to about 0.05 wt % of said first promoter, and from about 0.1 wt % to about 1 wt % of said second promoter.

Claim 4. (original) The catalyst of Claim 1 wherein said metal is selected from the group consisting of nickel, cobalt, iron, ruthenium, osmium, platinum, palladium, iridium, rhenium, molybdenum, chromium, tungsten, vanadium, rhodium, copper, zinc, and combinations thereof.

Claim 5. (original) The catalyst of Claim 4 wherein said metal is cobalt.

Claim 6. (currently amended) The catalyst of Claim 1 wherein said promoter is selected from the group consisting of boron, cerium, chromium, copper, iridium, iron, lanthanum, manganese, molybdenum, palladium, platinum, rhenium, rhodium, ruthenium, strontium, tungsten, vanadium, zinc, sodium oxide, potassium oxide, rubidium oxide, cesium oxide, magnesium oxide, titanium oxide, zirconium oxide, ~~and other rare earth metals, such as~~ scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, other rare earth metals and combinations thereof.

Claim 7. (original) The catalyst of Claim 2 wherein said first promoter is selected from the group consisting of palladium, platinum, ruthenium, rhenium, rhodium, iridium and a combination thereof; and said second promoter is selected from the group consisting of potassium, boron, cesium, lanthanum, cerium, strontium, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, palladium, platinum, ruthenium, rhenium, rhodium, iridium and combinations thereof.

Claim 8. (original) The catalyst of Claim 1 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 9. (original) The catalyst of Claim 8 wherein said support is γ-alumina.

Claim 10. (original) The catalyst of Claim 9 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 11. (currently amended) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein said particle ~~being~~ is formed by the steps of:

a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;

b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;

c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is ~~essentially completely~~ reacted with said support;

d) separating said slurry into a solid portion and a liquor portion;

e) washing said solid portion with water;

f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and

g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

Claim 12. (original) The catalyst of Claim 11 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 13. (original) The catalyst of Claim 12 wherein said support is aluminum oxide.

Claim 14. (original) The catalyst of Claim 12 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 15. (original) The catalyst of Claim 11 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 16. (currently amended) The catalyst of Claim 15 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water ~~molecules~~, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 17. (original) The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

Claim 18. (original) The catalyst of Claim 11 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 19. (original) The catalyst of Claim 11 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 20. (original) The catalyst of Claim 11 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 21. (original) The catalyst of Claim 11 wherein said particles are further stabilized to prevent pyrophoric reactions when said particles are in the presence of air.

Claim 22. (currently amended) The catalyst of Claim 21 wherein said particles are stabilized by ~~being coated~~ coating with oil.

Claim 23. (currently amended) The catalyst of Claim 11 further including at least one promoter, wherein said promoter ~~being~~ is added with said cobalt salt solution.

Claim 24. (original) The catalyst of Claim 23 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 25. (original) The catalyst of Claim 11 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claims 26 – 34. (canceled)

~~26. A method for making a catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, said method comprising:~~
~~a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;~~
~~b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;~~
~~c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is essentially completely reacted with said support;~~
~~d) separating said slurry into a solid portion and a liquor portion;~~
~~e) washing said solid portion with water;~~
~~f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and~~
~~g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.~~

~~27. The catalyst of Claim 26 wherein said support is aluminum oxide.~~

~~28. The catalyst of Claim 27 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.~~

~~29. The catalyst of Claim 26 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).~~

~~30. The catalyst of Claim 26 wherein said solid portion is dried at from about 120°C to about 260°C in step f).~~

~~31. The catalyst of Claim 26 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.~~

~~32. The catalyst of Claim 26 wherein said particles are further stabilized by being coated with oil.~~

~~33. The catalyst of Claim 26 further including at least one promoter, said promoter being added with said cobalt salt solution.~~

~~34. The catalyst of Claim 33 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.~~

Claim 35. (new) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, wherein said particle is formed by the steps of:

a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;

b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;

c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;

d) separating said slurry into a solid portion and a liquor portion;

e) washing said solid portion with water;

f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles;

g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours; and

h) stabilizing said particles to prevent pyrophoric reactions when said particles are in the presence of air by coating said particles with oil.

Claim 36. (new) The catalyst of Claim 35 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 37. (new) The catalyst of Claim 36 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 38. (new) The catalyst of Claim 35 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 39. (new) The catalyst of Claim 38 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 40. (new) The catalyst of Claim 35 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 41. (new) The catalyst of Claim 35 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 42. (new) The catalyst of Claim 35 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 43. (new) The catalyst of Claim 35 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 44. (new) The catalyst of Claim 43 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 45. (new) The catalyst of Claim 35 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 46. (new) The catalyst of Claim 35 wherein said support is aluminum oxide and said aqueous cobalt salt solution comprises water and hexaammine cobalt (II) carbonate.

*Attachment: Clean Unmarked Version of Claims Now in Application*

## REMARKS / ARGUMENTS

### *Remarks Regarding Informalities and Claims Rejected Under 35 USC §112*

Claims 1 – 25 remain in the application. Claims 35 – 46 have been added to the application and are presented for examination. Claims 26 – 34 have been withdrawn in response to a requirement by the Examiner that the claims be restricted to Claims 1 – 25, drawn to a catalyst, or to Claims 26 – 34, drawn to a process of preparing a catalyst. In view of the Examiner's earlier restriction requirement, applicant retains the right to present claims 26 – 34 in a divisional application.

The Examiner objected to claims 1, 11, 16, 22, and 23 because of noted informalities. As proposed by the Examiner, claims 1 and 11 have been reworded in lines 1 – 3. Further, as proposed by the Examiner: in claim 1, line 5, "being" has been replaced with "are"; in claim 11, line 2, "being" has been replaced with "is"; and, in claim 16, line 2, "molecules" has been deleted to retain consistency with the language of claim 15. Further formality amendments include: in claim 22, line 1, "being coated" has been deleted and replaced with "coating"; and in claim 23, line 2, "being" has been replaced with "is" and "wherein" has been added. The amendments of claim 22 and claim 23 were suggested by the Examiner but required further correction than proposed to have grammatically correct sentences after amendment. Finally, in claim 11, step (c), "essentially completely" has been deleted to address a concern raised by the Examiner with the original language. No new subject matter has been added in making these amendments.

The Examiner objected to claim 17 based on the failure to comply to 37 CFR 1.75(c). The applicant respectfully challenges this objection. Claim 17 depends from claim 16 which recites a cobalt (II) complex having "coordination sphere ligands selected from the group consisting of water, ammonia, ..." Claim 17 recites "The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate." As is known in the art, the "hexaammine cobalt (II) carbonate" coordination sphere ligands are ammonia, as recited in claim 16. The carbonate is not a coordination sphere ligand but rather a counterion to the positively charged cobalt ion. Thus, applicant requests the Examiner to reconsider his objection with respect to claim 17.

Claims 1 – 10 and 16 – 17 were rejected under 35 U.S.C. §112. The Examiner states that Claim 1 recites the limitation "the metal oxide" with insufficient antecedent basis for this limitation. The applicant respectfully notes that in the specification on page 4, lines 2 – 3, the catalyst has "a metal oxide crystallite size of from about 40 Å to about 200 Å." On page 12, lines 11 – 15, the metal oxide is more narrowly defined as the "cobalt oxide crystallite size" – and as is known in the art, cobalt is considered a metal when in reference to oxides – and the "cobalt oxide crystallite size ... is greater than about 40 Å diameter, and is preferably less than about 200 Å." Thus, applicant requests the Examiner to reconsider his objection under 35 U.S.C. §112 with respect to claim 1, and its dependent claims 2 – 10. If it would expedite matters, the applicant is willing to amend the paragraph on page 12 to include the more inclusive language of page 4 if so requested by the Examiner.

As noted by the Examiner, Claim 6 included the indefinite phrase "such as". Claim 6 has been amended to delete this phrase and should now be in allowable form.

As noted by the Examiner, Claim 16 included improper Markush terminology. Claim 16 has been amended to be consistent with the correct Markush phrase, and claim 16 and its dependent claim 17 should now be in allowable form.

***Remarks Regarding Allowable Subject Matter***

The Examiner has indicated that Claim 22 is objected to as being dependent on a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response to this rejection, new claim 35 is presented. New claim 35 includes the limitations of rejected independent claims 11 (preamble and steps a – g), rejected dependent claim 21 and objected to dependent claim 22 (step h). Claims 36 – 46 have been added as claims dependent on new independent claim 35. As amended, independent claim 35 is believed to now be in allowable form. Because they depend from an allowable claim, dependent claims 36 – 46 are also believed to now be in allowable form.

The Examiner has also indicated that claims 1 – 10 would be allowable if the 35 U.S.C. §112 rejection is overcome. As noted in the prior section, page 4, lines 2 – 3, of the specification teach a catalyst that has "a metal oxide crystallite size of from about 40 Å to about 200 Å" and page 12, lines 11 – 15, of the specification teach "cobalt oxide crystallite size ... greater than about 40 Å diameter, and is preferably less than about 200 Å." Applicant is willing to amend the paragraph on page 12 to include the more inclusive language of page 4 if so requested by the Examiner.

***Remarks Regarding Citations***

Applicant has made note of the prior art recited by the Examiner in Paragraph 15 of his Office Action mailed March 26, 2003.

***Remarks Regarding Claims Rejected Under 35 USC §102(b) and 35 USC §103(a)***

The Examiner has rejected independent claim 11 and dependent claims 12, 14 – 21, 23 and 25 under 35 U.S.C 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Shen et al, U.S. Patent 5,962,367 ("the '367 patent"). Applicant respectfully traverses both rejections.

The Examiner has further rejected independent claim 11 and dependent Claims 12 – 13, 15 – 21 and 23 – 25 under 35 U.S.C 102(b) as anticipated by or in the alternative, under 35 U.S.C. 103(a) as obvious over Sapienza et al., U.S. Patent 4,396,539 ("the '539 patent"). Applicant respectfully traverses both rejections.

*Summary of the Present Invention*

The Fischer-Tropsch catalyst of the present invention is a transition metal-based catalyst having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support, and a small metal oxide crystallite size. In a first embodiment, the catalyst has a surface area of from about 100 $m^2/g$ to about 250 $m^2/g$; an essentially smooth, homogeneous surface morphology; an essentially uniform distribution of metal throughout an essentially inert support; and a metal oxide crystallite size of from about 40 Å to about 200 Å. Optionally, the catalyst may further comprise at least one promoter.

The Fischer-Tropsch catalyst of independent claim 11 of the present application, as amended, is a catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein the particle is formed by several prescribed steps. Claims 12 – 25 of the present application depend from independent claim 11.

As provided in dependent claim 14, the catalyst of claim 11 may be prepared from a support having a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm. However, as discussed on page 28, line 1 through page 29, line 4 and as shown in Figures 1A – 4, two catalysts prepared with the same support material can have significantly different physical characteristics depending upon the process used to make the catalyst. (*N.B.*: In the examples of the present applciation each catalyst was prepared using a Puralox SCCa 5/150 support having a surface area of about 160 $m^2/g$, a pore volume of about 0.50 ml/g, and a pore diameter of about 12.55 nm.) The steps outlined in independent claim 11 result in a catalyst particle having the desired physical characteristics. Prior art methods of catalyst particle preparation, even starting with the same support, do not result in the catalyst particle of the present invention.

*Summary of U.S. Patent 5,962,367, Shen et al.*

U.S. Patent 5,962,367 teaches a process for preparing a catalyst support primarily formed of titania. The catalyst support comprises 60 wt% to 100 wt % titania as $TiO_2$ and 0 wt% to 40 wt % alumina as $Al_2O_3$. As noted by the Examiner, the '367 patent teaches a cobalt molybdate catalyst supported on a titania support, wherein the support has a surface area ranging from 80 $m^2/g$ to 200 $m^2/g$, a pore volume of from about 0.3 ml/g to about 0.5 ml/g, and a pore diameter of from about 6 nm to about 20 nm.

The '367 patent then teaches using this catalyst support to prepare a cobalt molybdate catalyst using an impregnation process. At column 5, lines 6 – 8, the '367 states "the dynamic co-impregnation

method is used for supporting the cobalt and molybdenum active components ..." In Examples 4 – 7, the support is "immersed into the impregnating solution ..." for the preparation of the catalyst.

However, the '367 patent does not teach or suggest that the catalyst resulting from the impregnation process using the '367 titania support has a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size as is seen with the preparation process of the present invention. Rather, there is nothing in the '367 patent that suggests that the physical characteristics of the cobalt molybdate catalyst prepared by the impregnation process would be any different than the catalysts prepared by the prior art impregnation method and reported in Example 6 (and Figures 2A, 2B and 4) of the present application. Further, the catalyst of the present invention made by the process of instant claim 11 would not be anticipated or obvious merely because a titania support is used, or the physical characteristics of the support are similar to supports of the prior art, or because a promoter is added. Thus, independent claim 11 and its dependent claims 12 – 25 are not anticipated nor obvious in view of U.S. Patent 5,962,367.

*Summary of U.S. Patent 4,396,539, Sapienza et al.*

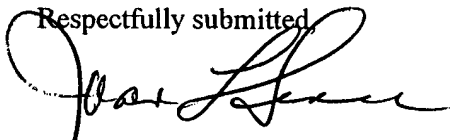
U.S. Patent 4,396,539 teaches a process for preparing a catalyst suitable for Fischer-Tropsch synthesis wherein the catalyst is composed of palladium or platinum and cobalt supported on a solid support. More specifically, the '539 patent teaches an alumina, silica gel, kieselguhr, or zinc oxide support that is impregnated by immersion of the support in an aqueous solution of the salt of a palladium or platinum metal. The palladium- or platinum-treated support is then immersed in a solution containing primarily cobalt.

The objective of the process set forth in the '539 patent is to achieve a catalyst particle with the metal loading as a coating around the support. The catalyst structure depicted in Figure 5 is believed to "best represent the idealized structure of this catalyst" (column 4, lines 9 – 21). By contrast, the process of claim 11 of the present invention produces a catalyst that has "an essentially uniform distribution of cobalt throughout the support". In other words, the process taught in the '539 patent teaches away from the desired product of the present invention. Thus, independent claim 11 and its dependent claims 12 – 25 are not anticipated nor obvious in view of U.S. Patent 4,396,539.

Because U.S. Patent 5,962,367 and U.S. Patent 4,396,539 each teach a process for preparing a catalyst that relies on impregnation to deliver the metal to the support, the product-by-process taught by the amended claim 11 of the present application is neither anticipated nor obvious. Thus, applicant respectfully requests that the §102(b) and the §103(a) rejections be withdrawn and that independent claim 11, as amended, and its dependent claims 12 – 25, be allowed.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,



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**Clean Unmarked Version of Claims Now in Application**

Claim 1. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising a catalyst particle, which comprises at least one metal that is an efficient carbon monoxide adsorber and at least one promoter dispersed on a support to form said catalyst particle, said particle having a BET surface area of from about 100 $m^2/g$ to about 250 $m^2/g$, and said metal and said promoter are dispersed on the support such that the crystallite size of the metal oxide is from about 40 Å to about 200 Å, and said particle having an essentially smooth, homogeneous surface morphology.

Claim 2. The catalyst of Claim 1 wherein said particle comprises from about 5 wt % to about 60 wt % cobalt, and from about 0.0001 wt % to about 1 wt % of a first promoter, and from about 0.01 wt % to about 5 wt % of a second promoter.

Claim 3. The catalyst of Claim 2 wherein said particle comprises from about 10 wt% to about 30 wt % cobalt, and from about 0.01 wt % to about 0.05 wt % of said first promoter, and from about 0.1 wt % to about 1 wt % of said second promoter.

Claim 4. The catalyst of Claim 1 wherein said metal is selected from the group consisting of nickel, cobalt, iron, ruthenium, osmium, platinum, palladium, iridium, rhenium, molybdenum, chromium, tungsten, vanadium, rhodium, copper, zinc, and combinations thereof.

Claim 5. The catalyst of Claim 4 wherein said metal is cobalt.

Claim 6. The catalyst of Claim 1 wherein said promoter is selected from the group consisting of boron, cerium, chromium, copper, iridium, iron, lanthanum, manganese, molybdenum, palladium, platinum, rhenium, rhodium, ruthenium, strontium, tungsten, vanadium, zinc, sodium oxide, potassium oxide, rubidium oxide, cesium oxide, magnesium oxide, titanium oxide, zirconium oxide, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, other rare earth metals and combinations thereof.

Claim 7. The catalyst of Claim 2 wherein said first promoter is selected from the group consisting of palladium, platinum, ruthenium, rhenium, rhodium, iridium and a combination thereof; and said second promoter is selected from the group consisting of potassium, boron, cesium, lanthanum, cerium, strontium, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, palladium, platinum, ruthenium, rhenium, rhodium, iridium and combinations thereof.

Claim 8. The catalyst of Claim 1 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 9. The catalyst of Claim 8 wherein said support is γ-alumina.

Claim 10. The catalyst of Claim 9 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 11. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein said particle is formed by the steps of:

a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;

b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;

c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;

d) separating said slurry into a solid portion and a liquor portion;

e) washing said solid portion with water;

f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and

g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

Claim 12. The catalyst of Claim 11 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 13. The catalyst of Claim 12 wherein said support is aluminum oxide.

Claim 14. The catalyst of Claim 12 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 15. The catalyst of Claim 11 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 16. The catalyst of Claim 15 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 17. The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

Claim 18. The catalyst of Claim 11 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 19. The catalyst of Claim 11 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 20. The catalyst of Claim 11 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 21. The catalyst of Claim 11 wherein said particles are further stabilized to prevent pyrophoric reactions when said particles are in the presence of air.

Claim 22. The catalyst of Claim 21 wherein said particles are stabilized by coating with oil.

Claim 23. The catalyst of Claim 11 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 24. The catalyst of Claim 23 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 25. The catalyst of Claim 11 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 35. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, wherein said particle is formed by the steps of:

a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;

b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;

c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;

d) separating said slurry into a solid portion and a liquor portion;

e) washing said solid portion with water;

f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles;

g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours; and

h) stabilizing said particles to prevent pyrophoric reactions when said particles are in the presence of air by coating said particles with oil.

Claim 36. The catalyst of Claim 35 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 37. The catalyst of Claim 36 wherein said support has a particle size of from about 60 μm to about 150 μm, a surface area of from about 90 $m^2/g$ to about 210 $m^2/g$, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 38. The catalyst of Claim 35 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 39. The catalyst of Claim 38 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 40. The catalyst of Claim 35 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 41. The catalyst of Claim 35 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 42. The catalyst of Claim 35 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 43. The catalyst of Claim 35 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 44. The catalyst of Claim 43 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 45. The catalyst of Claim 35 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 46. The catalyst of Claim 35 wherein said support is aluminum oxide and said aqueous cobalt salt solution comprises water and hexaammine cobalt (II) carbonate.